Amphibians and Fish

While doing visual surveys at ponds and wetlands, we recorded the presence or absence of fish. We observed that several of the ponds at the upper elevation (Webb Creek, Soldiers Meadow, and Larabee Dam) and most of the ponds in the riverine habitat were inhabited by fish. Western Toads were the only amphibian we observed breeding in upper and lower elevation ponds with fish (Figure 52). Two non-breeding juveniles and one adult Bullfrog were also found in a small channel (Peninsula Pond) along the Salmon River that was inhabited by carp. Our statistical analysis for all ponds showed that Western Toads were more likely to be found in ponds with fish than without fish ($P < .05$) (Table 8). Previous studies (Voris and Bacon 1966), have shown that *Bufo* tadpoles may be distasteful to fish predators.

From our observations, Spotted Frogs and Long-toed Salamanders were more likely to be found breeding in ponds without fish than in ponds with fish ($P<.05$) (Table 8). At some of the aquatic sites with fish, only adult Spotted Frogs were located. These sites included: Webb Creek Pond, Larabee Dam, Eagle Creek and lower Deer Creek. We found no statistical difference in Pacific Treefrogs favoring ponds with or without fish. It is noteworthy that Spotted Frogs and Long-toed Salamanders were found breeding in the adjoining wet meadow of Larabee Dam. This area was inaccessible to fish.

Co-occurrence

Because the occurrence of one species of amphibian may influence the occurrence of other amphibian species, we examined the relationships among pond dwelling amphibian species. We calculated the number and percentage of sites at which zero to four species were detected (Clark et al. 1993). To determine the probability of finding a particular species at a specific site (based on the presence of another species), we calculated the probabilities of species co-occurrences for 1994 and 1995 (Table 3). The numbers include ponds with breeding as well as just adult amphibian sightings. For example, Table 3 indicates that if Spotted Frogs were found at a specific site, there would be a high probability (83%) of finding a Long-toed Salamander and a low probability (12%) of finding a Western Toad.

SUMMARY AND CONCLUSIONS

1. Amphibians and reptiles were unevenly distributed throughout Craig Mountain, with most amphibian species (5 out of 7) occurring at the higher elevations and most reptiles (7 out of 9) occurring at the lower elevations.

2. The Great Basin Spadefoot and Night Snake are two new records for Craig Mountain. The sightings of these species suggest that they also occur in Hells Canyon and along the lower Snake River.

3. Two temporary ponds with Spotted Frog tadpoles were located at Limekiln Rapids along the Snake River. This is a new and unexpected observation because of the low elevation and the habitat type.

4. The peak amphibian breeding months at the upper elevation aquatic sites occur in April and May. Peak breeding at the low riverine ponds occur in June and July.

5. Long-toed Salamanders were the most abundant breeding amphibian and Western Terrestrial Garter Snakes the most abundant reptile at high elevation sites. Western Toads were the most common amphibian and Racers the most common reptile at the low elevation.

6. Out of all of the survey techniques employed in 1994 and 1995, visual searches were the most successful technique in detecting most amphibians and reptiles.

7. Western Toads were the most widespread breeding amphibian within the elevation levels and within wetland-types.

8. Western Toads were also the only pond dwelling amphibian found breeding with fish.

Future Monitoring and Management Recommendations

Craig Mountain is a large and diverse habitat full of wet meadows dispersed throughout the open forest. Many species of amphibians of reptiles occur in this area, some of them sensitive or species of special concern. To better understand species distributions and habitat requirements more thoroughly, it will be important to gather long-term data. Long-term monitoring and surveys are the main tools we have for assuring the existence of amphibians and reptiles in the future.

1.) Monitoring the Bullfrog population along the Salmon River will be important because it is an exotic species and a predator on native amphibians. The current population of Bullfrogs on CM may be low enough that with continual monitoring, expansion of the population could be curtailed. In addition, an unlimited bag limit on hunting Bullfrogs might also help control the population.

2.) Do not introduce fish into ponds that are important breeding grounds for amphibians (i.e., Robert's Spring). Fish introductions have been correlated with the extermination of native amphibians in the Northwest. Spotted Frogs, Long-toed Salamanders, and Pacific Treefrogs were found breeding in 1994 and 1995 in Robert's Spring. If fish are introduced into this pond, these species will most likely disappear because of their vulnerability to predation by fish..

One alternative would be to create adjacent wetlands that are shallow enough for amphibians to breed in, but fish cannot access. An example is Larabee Dam and its adjacent wetland (Dam-1 pond). In this pond, Spotted Frogs and Long-toed Salamanders were successful in breeding because the fish in Larabee Dam could not get to this small pond. The *Carex* was dense enough and water level low enough that fish were excluded.

3.) Monitor the Western Toad population in the upper elevation ponds. Upper elevation ponds could be vulnerable to environmental or anthropogenic changes. The monitoring would be done in conjunction with the yearly amphibian breeding surveys.

4.) Due to the time constraints and large study area, it would be impossible to survey all of the upper of the upper elevation ponds every spring. There are approximately 44 ponds along the upper elevation area These could be broken up into three groups and surveys rotated every year. Ideally, surveys should be conducted at least once a week from April 1 through May 15.

5.) Protect the isolated populations of Tailed Frogs, especially South Fork of Caption John Creek. Because this population is isolated, recolonization would be unlikely. In addition, it would be beneficial to restrict activities that have the capability of altering the habitat (i.e., increase siltation, nutrients, and water temperature), and reducing habitat quality for Tailed Frogs.

6.) If any future stream surveys are conducted, document any new Tailed Frog or Idaho Giant Salamander sighting. The more information we have on the status of Tailed Frogs on Craig Mountain, the better we can manage this former C2 species.

7.) Grazing does not seem to be a large concern for the health of most of the ponds. There is one privately owned meadow that has the potential to be good amphibian breeding habitat, but cows actively graze the meadow and cause the water in the pond to be polluted. A potential project to see would be to fence off the pond to cows and document the recolonization of breeding amphibians. Adult Spotted Frogs have been seen in the adjacent wet meadows, but appropriate habitat is lacking.

8) Sightings of Night Snakes, a Ringneck Snake, and a Great Basin Spadefoot Toad were first time observations on CM. Therefore, it will be important to document any additional sightings of these rare species.

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TABLES

COMMON NAME	SCIENTIFIC NAME	STATUS	ELEVATION	DISTRIBUTION	ESTIMATED ABUNDANCE	VOUCHER	SUCCESSFUL SAMPLING TECHNIQUES *
Present							
Long-toed Salamander	*Ambystoma macrodactylum*		Upper	Widespread	Abundant	specimen, photo	search,pitfall, coverboard
Tailed Frog	*Ascaphus truei*	C2	Upper	Limited	Abundant	specimen, photo	search, incidental
Western Toad	*Bufo boreas*	SSC C, BLM S	Upper & Lower	Widespread	Abundant	specimen, photo	search, night driving, pitfall, funnel, incidental
Great Basin Spadefoot	*Spea intermontana*		Lower	Limited	Rare	specimen	incidental
Pacific Treefrog	*Pseudacris regilla*		Upper & Lower	Widespread	Common	specimen, photo	calling, search
Bullfrog	*Rana catesbiana*		Lower	Limited	Rare	specimen	search
Spotted Frog	*Rana pretiosa*	C2, BLM S	Upper & Lower	Widespread	Abundant	specimen, photo	search, incidental, pitfall
Western Fence Lizard	*Sceloporus occidentalis*		Lower	Widespread	Common	specimen, photo	search, incidental, funnel, coverboard
Western Skink	*Eumeces skiltonianus*		Upper & Lower	Limited	Uncommon	specimen, photo	search, pitfall
Rubber Boa	*Charina bottae*		Upper	Limited	Uncommon	photo	night driving
Racer	*Coluber constrictor*		Upper &Lower	Widespread	Common	specimen, photo	search, incidental, funnel
Ringneck Snake	*Diadophis punctatus*	SSC C, BLM S	Lower	Limited	Rare	observation	incidental
Night Snake	*Hypsiglena torquata*		Lower	Limited	Uncommon	specimen, photo	search, funnel
Gopher Snake	*Pituophis catenifer*		Upper & Lower	Widespread	Common	photo	search, incidental, funnel
Western Terrestrial Garter Snake	*Thamnophis elegans*		Upper & Lower	Widespread	Common	specimen, photo	search, incidental
Common Garter Snake	*Thamnophis sirtalis*		Upper	Widespread	Uncommon	specimen, photo	search
Western Rattlesnake	*Crotalus viridis*		Lower	Widespread	Common	photo	search, incidental, funnel
Possible							
Idaho Giant Salamander	*Dicamptodon aterrimus*						* Ranked from high to low success
Woodhouse's Toad	*Bufo woodhousei*						
Painted Turtle	*Chrysemys picta*						
Short-horned Lizard	*Phrynosoma douglassii*						

IDFG Species of Special Concern
- SSC A = Priority Species
- SSC B = Peripheral Species
- SSC C = Undetermined Status Species

C2 = USDI USFWS Category 2 Candidate Species for T & E Species Status

BLM = USDI Bureau of Land Mangement
- S = Sensitive Species

Upper elevation = above 2500 ft.
Lower elevation = below 2500 ft.

Widespread = >10 sites
Limited = < 10 sites

Abundant = > 30 animals found
Common = between 6-30 animals found
Uncommon = < 6 animals found
Rare = Only 1 animal found

Table 1. Species checklist for Craig Mountain

Amphibians and Reptiles Observed by Sampling Technique

Amphibians

SAMPLING TECHNIQUE	AMMA	ASTR	BUBO	SPIN	PSRE	RACA	RAPR
Breeding Surveys	10, 19	0	92, 50	1, 0	3, 4	1, 2	270, 160
Incidental Observ.	2, 0	0	31, 2	0	1, 0	0	4, 3
Pitfall Traps (1994)	30, 0	0	3, 0	0	0	0	3, 0
Funnel Traps	1, 0	0	8, 5	0	0	0	0
Road Driving-night	0, 0	0	15, 4	0	0	0	0
Stream Surveys	2, 3	50, 0	1, 1	0	0	0	2, 3
Calling Surveys (1994)	0	0	0	0	>19	0	1
TOTAL (1994, 1995)	45, 22	50, 0	150, 62	1, 0	23, 4	1, 2	280, 166

Reptiles

SAMPLING TECHNIQUE	SCOC	EUSK	CHBO	COCO	HYTO	PICA	THEL	THSI	CRVI
Breeding Surveys	0	0	0	0	0	0	49, 10	6, 3	0
Incidental Observ.	13, 10	12, 0	0, 4	25, 7	1, 2	14, 1	17, 8	1, 1	14, 3
Pitfall Traps (1994)	0	1	0	0	0	0	0	0	0
Funnel Traps	2, 6	0	0	4, 13	0, 1	1, 2	0	0	2, 1
Road Driving-night	0	0	3, 0	5, 0	0	0	0	0	2, 0
Stream Surveys	0	0	0	0	0	0	3, 0	0	0
Calling Surveys	0	0	0	0	0	0	0	0	0
TOTAL (1994, 1995)	15, 16	13, 0	3, 4	34, 20	1, 3	15, 3	69, 18	7, 4	18, 4

Table 2. Number of adult amphibian and reptile species detected from the 1994 and 1995 surveys. One unconfirmed sighting of a Ringneck Snake was reported in 1993 .

1994 Amphibian Co-occurrence Table

Species	Spotted Frog	Long-toed Salamander	Western Toad	Chorus Frog
Spotted Frog [23]	X	0.91 (21/23)	0.17 (4/23)	0.22 (5/23)
Long-toed Salamander [23]	0.91 (21/23)	X	0.09 (2/23)	0.17 (4/23)
Western Toad [16]	0.25 (4/16)	0.13 (2/16)	X	0.13 (2/16)
Pacific Treefrog [9]	0.56 (5/9)	0.44 (4/9)	0.22 (2/9)	X

1995 Amphibian Co-occurrence Table

Species	Spotted Frog	Long-toed Salamander	Western Toad	Pacific Treefrog
Spotted Frog [31]	X	0.76 (25/31)	0.13 (4/31)	0.39 (12/31)
Long-toed Salamander [28]	0.86 (24/28)	X	0.04 (1/28)	0.04 (1/28)
Western Toad [13]	0.31 (4/13)	0.08 (2/13)	X	0.08 (1/13)
Pacific Treefrog [13]	0.92 (12/13)	0.85 (11/13)	0.08 (1/13)	X

Table 3. This table represents the probability of species co-occurrence based on results from the 1994 and 1995 surveys. Numbers in parentheses in the row headings indicate the total number of sites where that particular species occurred. Reading across the rows, the numbers in the individual cells represent the probability of co-occurrence between two species based on the number of sites where the species in that row occurs.

Amphibian Species Interactions	Western Toad and LT Salamander	Western Toad and Pacific Treefrog	Western Toad and Spotted Frog
1994 N= 43 ponds, .05, df= 1	P = 0.0165 Negative correlation	P =1.00 No significance	P = 0.7041 No significance
1995 N= 55 ponds, .05, df=1	P = 0.3364 No significance	P = 0.6233 No significance	P = 0.1441 No signifcance

Table 4. Fisher's Exact Test, summary of 2x2 contingency tables of 1994 and 1995 data showing the association of amphibian species co-occurring in ponds. (See Appendix F for full contingency tables.)

Amphibian Species Interactions	LT Salamander and Pacific Treefrog	LT Salamander and Spotted Frog	Pacific Treefrog and Spotted Frog
1994 N= 53 ponds, .05, df = 1	P = 1.00 No significance	P = 0.00005 positive correlation	P = 0.1417 No significance
1995 N= 55 ponds, .05, df= 1	P = 0.0151 positive correlation	P = 0.0005 positive correlation	P = 0.0683 No significance

Table 5. Fisher's Exact Test, summary of 2x2 contingency tables of 1994 and 1995 data showing the association of amphibian species their co-occurrence in ponds. (See Appendix F for full contingency tables)

Natural vs human-influenced ponds	**Long-toed Salamander** (n = 23, 28)	**Western Toad** (n = 16, 13)	**Pacific Treefrog** (n = 9, 13)	**Spotted Frog** (n = 23, 31)
1994 N= 53 ponds, 0.05, df= 1	P = 0.0328 prefers h-influenced	P = 0.0023 prefers natural	P = 1.00 No significance	P = 0.0328 prefers h-influenced
1995 N= 55 ponds, 0.05, df=1	P = 0.0001 prefers h-influenced	P = 0.0014 prefers natural	P = 0.3026 No significance	P = 0.0014 prefers h-influenced

Table 6. Fisher's Exact Test, summary of 2x2 contingency tables from 1994 and 1995 data. This table shows the association of amphibian species and their occurrence at natural vs human-influenced ponds. (See Appendix F for full contingency tables).

Upper vs Lower elevation ponds	**Long-toed Salamander** (n = 23, 28)	**Western Toad** (n = 16, 13)	**Pacific Treefrog** (n = 9, 13)	**Spotted Frog** (n = 23, 31)
1994 N= 53 ponds, .05, df = 1	P = 0.0029 prefers upper ponds	P = 0.00002 prefers lower ponds	P = 0.1805 No significance	P = 0.0029 prefers upper ponds
1995 N= 55 ponds, .05, df= 1	P = 0.001 prefers upper ponds	P = 0.0001 prefers lower ponds	P = 0.0924 No significance	P = 0.0063 prefers upper ponds

Table 7. Fisher's Exact Test, summary of 2x2 contingency tables from 1994 and 1995 data. This table shows the association of amphibian species and their occurrence at Upper vs Lower elevation ponds. (See Appendix F for full tables.)

Ponds with and without fish	Long-toed Salamander (n = 23, 28)	Western Toad (n = 16, 13)	Pacific Treefrog (n = 9, 13)	Spotted Frog (n = 23, 31)
1994 N= 53 ponds, .05, df = 1	P = 0.0002 negative correlation	P = 0.00008 positive correlation	P = 0.0924 No significance	P = 0.0252 negative correlation
1995 N= 55 ponds, .05, df= 1	P = 0.000005 negative correlation	P = 0.000008 positive correlation	P = 0.0245 No significance	P = 0.0004 negative correlation

Table 8. Fisher's Exact Test, summary of 2x2 contingency tables of 1994 and 1995 data showing the association of amphibian species co-occurring in ponds with and without warm water fish. (See Appendix F for full contingency tables.)